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$\lim_{x\to 0^+} x^{\ln x} = \lim_{x\to 0^+} e^{\ln\left(x^{\ln x}\right)} = e^{\lim_{x\to 0^+} \ln\left(x^{\ln x}\right)}$ and we'll just look at the limit without the "e" since I can't see all those small things. Remember – we have to raise e to the power of our next answer though.

$\lim_{x\to 0+} \ln\left(x^{\ln x}\right) = \lim_{x\to 0+} (\ln x)(\ln x)$ and we don't need to use L'Hospital's Rule. As *x* approaches 0 from the right, ln(*x*) approaches negative infinity; and I am here squaring a LARGE negative number and so the product approaches positive infinity.

Remembering the *e* base, my answer is *e*^(increasingly large positive number) and so the limit is +infinity.

Common stumbles: processing the log of a power incorrectly, and forgetting that the 'answer' is the power that *e* is raised to.

5.2 /

A student asks how the calculator can be used to sum the elements of a sequence if the 'increment' (or change in the index variable) in not simply 1.

There are two answers to this:

A) The full "syntax" of the **seq** command on the calculator is:

Seq(*expression, variable, start, end, increment)*

If you leave *increment* off, it defaults to 1. But you can put it in, and add 2, or 5/2 or almost whatever you need.

B) That was the technology answer. However, you can always(* = I think) manipulate the expression algebraically to get **the thing that's changing** to go up by 1 each time.

Here are a couple of standard manipulations:

Odd numbers: 1, 3, 5, 7, … becomes $\sum_{i=1}^{n}(2i-1) = 2\sum_{i=1}^{n}(i) - n$ because there are *n* "-1"s

Even numbers: 0, 2, 4, 6, … becomes $\sum_{i=1}^{n}(2i-2) = 2\sum_{i=1}^{n}(i) - 2n$

Decreasing numbers: 10, 9, 8, …, 1 becomes $\sum_{i=1}^{n}(11-i) = 11n - \sum_{i=1}^{n}(i)$

And a reminder – you should ALWAYS look to ***think*** your way to a solution (for example, using option B) instead of relying on technology. Your goal should be to increase your capacity to think and to problem solve, rather than to get the 'correct' answer.

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a) the area of a triangle with vertices at $(-a,0),(a,0),(0,a^2)$ is $\frac{1}{2}(2a)(a^2)=a^3$

The area of the parabolic segment is $\int_{-a}^{a} a^2 - x^2 dx$. Use the FTC, find an antiderivative, and evaluate the definite integral and the result should fall in your lap. (Notice that, since the function is even, this is the same as $2\int_{0}^{a} a^2 - x^2 dx$)

b) similar to a

5.5 / 62 (Unit Area means an area of 1 square unit)

a) set up the definite integral: $\int_{1}^{b} \frac{1}{x} dx$, evaluate, and solve. Note that, since $\frac{d}{dx}(\ln x) = \frac{1}{x}$ (basic rule), the antiderivative will be ln(x)

b) same as (a), only now the antiderivative just uses the power rule.

c) thinking is required (it's really just a comparison I think)

5.6 /

34) use $u = y+1$, then divide after multiplying out numerator
35) use $u = x+4$. Often the most effective substitution is to use whatever is inside the radical
36) use u=denominator